CLAIMS

1. A miniature autonomous apparatus for scene interpretation, comprising:

image acquisition means;

image processing means directly connected with said image acquisition means;

memory means connected with said image acquisition means and with said processing means;

power supply; and

communication means,

wherein said processing means comprise:

means for determining an initial parametric representation of said scene;

means for updating said parametric representation according to predefined criteria;

means for analyzing said image, said means for analyzing comprising:

means for determining, for each pixel of said image, whether it is a hot pixel, according to predefined criteria;

means for defining at least one target from said hot pixels;

means for measuring predefined parameters for at least one of said at least one target; and

means for determining, for at least one of said at least one target whether said target is of interest, according to application-specific criteria,

and wherein said communication means are adapted to output the results of said analysis.

2. The apparatus of claim 1, additionally comprising:

means for tracking at least one of said at least one target, said means of tracking comprising means for measuring motion parameters of said target.

3. The apparatus of claim 1, wherein said image acquisition means comprises a digital camera.

4. The apparatus of claim 3, wherein said digital camera is CMOS type.

5. The apparatus of claim 1, wherein said image processing means comprises a DSP.

6. The apparatus of claim 1, wherein said image processing means comprises a FPGA.

7. The apparatus of claim 1, wherein said means for determining an initial parametric representation of said scene comprises means for computing said initial parametric representation from a plurality of acquired images.

8. The apparatus of claim 7, wherein said means for computing said initial parametric representation comprises means for computing an average pixel image and means for computing a standard deviation pixel image from said plurality of acquired images.

9. The apparatus of claim 7, wherein said means for computing said initial parametric representation comprises means for computing a minimum pixel value image and a maximum pixel value image from said plurality of acquired images.

10. The apparatus of claim 7, wherein said means for computing said initial parametric representation comprises means for computing an average derivative value image and a standard deviation derivative pixel value image from said plurality of acquired images.

11. The apparatus of claim 8, wherein said means for updating said parametric representation comprises means for computing, for each pixel of said parametric representation, a new average pixel value and a new standard deviation value, using the value of a newly acquired pixel and a predetermined weight coefficient.

12. The apparatus of claim 9, wherein said means for updating said parametric representation comprises means for computing, for each pixel of said parametric representation, a new minimum pixel value and a new maximum pixel value, according to the value of a newly acquired pixel.

13. The apparatus of claim 12, wherein the maximum difference between said new minimum pixel value and the previous minimum pixel value is 1, and wherein the maximum difference between said new maximum pixel value and the previous maximum pixel value is 1.

14. The apparatus of claim 10, wherein said means for updating said parametric representation comprises means for computing, for each pixel of said parametric representation, a new average derivative pixel value and a new standard deviation derivative value, using the value of a newly acquired pixel and a predetermined weight coefficient.

15. The apparatus of claim 8, wherein said means for determining whether a pixel is hot comprises means for comparing the difference between the actual value and the average value of said pixel with the standard deviation of said pixel.

16. The apparatus of claim 9, wherein said means for determining whether a pixel is hot comprises means for comparing the difference between the actual value and the minimum and maximum values of said pixels.

17. The apparatus of claim 10, wherein said means for determining whether a pixel is hot comprises means for comparing the difference between the actual derivative value and the average derivative value of said pixel with the standard deviation derivative of said pixel.

18. The apparatus of claim 1, wherein said means for defining at least one target comprises means for segmenting said hot pixels into connected components.

19. The apparatus of claim 1, wherein said means for measuring predefined parameters comprises means for counting the hot pixels in said target.

20. The apparatus of claim 1, wherein said means for measuring predefined parameters comprises means for calculating the circumscribing rectangle of said target.

21. The apparatus of claim 1, wherein said means for determining whether said target is of interest comprises means for analyzing said measured predefined parameters according to said application-specific criteria.

22. The apparatus of claim 2, wherein said means for measuring motion parameters comprises means for matching said target with the same target in a previously captured image.

23. The apparatus of claim 22, wherein said means for matching comprises means for calculating the geometric centers of gravity of said target in the two images.

24. A method of scene interpretation, comprising the steps of:

determining an initial parametric representation of said scene;

updating said parametric representation according to predefined criteria;

acquiring an image of said scene;

analyzing said image, said step of analyzing comprising the steps of:

determining, for each pixel of said image, whether it is a hot pixel, according to predefined criteria;

defining at least one target from said hot pixels;

measuring predefined parameters for at least one of said at least one target; and

determining, for at least one of said at least one target whether said target is of interest, according to application-specific criteria; and

outputting the results of said analysis.

25. The method of claim 24, additionally comprising the step of:

tracking at least one of said at least one target, said step of tracking comprising the step of measuring motion parameters of said target.

26. The method of claim 24, wherein said step of determining an initial parametric representation of said scene comprises computing said initial parametric representation from a plurality of acquired images.

27. The method of claim 26, wherein said step of computing said initial parametric representation of said scene comprises computing an average pixel image and a standard deviation pixel image from said plurality of acquired images.

28. The method of claim 26, wherein said step of computing said initial parametric representation of said scene comprises computing a minimum pixel value image and a maximum pixel value image from

said plurality of acquired images.

29. The method of claim 26, wherein said step of computing said initial parametric representation of said scene comprises computing an average derivative value image and a standard deviation derivative pixel value image from said plurality of acquired images.

30. The method of claim 27, wherein said step of updating said parametric representation comprises computing, for each pixel of said parametric representation, a new average pixel value and a new standard deviation value, using the value of a newly acquired pixel and a predetermined weight coefficient.

31. The method of claim 28, wherein said step of updating said parametric representation comprises computing, for each pixel of said parametric representation, a new minimum pixel value and a new maximum pixel value, according to the value of a newly acquired pixel.

32. The method of claim 31, wherein the maximum difference between said new minimum pixel value and the previous minimum pixel value is 1, and wherein the maximum difference between said new maximum

pixel value and the previous maximum pixel value is 1.

33. The method of claim 29, wherein said step updating said parametric representation comprises means for computing, for each pixel of said parametric representation, a new average derivative pixel value and a new standard deviation derivative value, using the value of a newly acquired pixel and a predetermined weight coefficient.

34. The method of claim 27, wherein said step of determining whether a pixel is hot comprises comparing the difference between the actual value and the average value of said pixel with the standard deviation of said pixel.

35. The method of claim 28, wherein said step of determining whether a pixel is hot comprises comparing the difference between the actual value and the minimum and maximum values of said pixels.

36. The method of claim 29, wherein said step of determining whether a pixel is hot comprises comparing the difference between the actual derivative value and the average derivative value of said pixel with the standard deviation derivative of said pixel.

37. The method of claim 24, wherein said step of defining at least one target comprises segmenting said hot pixels into connected components.

38. The method of claim 24, wherein said step of measuring predefined parameters comprises counting the hot pixels in said target.

39. The method of claim 24, wherein said step of measuring predefined parameters comprises calculating the circumscribing rectangle of said target.

40. The method of claim 24, wherein said step of determining whether said target is of interest comprises analyzing said measured predefined parameters according to said application-specific criteria.

41. The method of claim 25, wherein said step of measuring motion parameters comprises matching said target with the same target in a previously captured image.

42. The method of claim 41, wherein said step of matching comprises

calculating the geometric centers of gravity of said target in the two images.